Yi 2
7397
F 5

5

Voice — continued
Sounds — 191
Whispering 192 Speech 195.
Singing — 193
Circulation of the
Blood — 216.

do they produce even the least oscillation.

2 If the lungs of a dead animal be filled with air, and a pressure afterwards made upon the thorax, a sound is emitted from the glottis, not unlike that which who natural to the same animal in its living State. How no one can suppose the organs of the voice to be in a tense state in a dead animal.

3 If the voice depended upon exciting tremulous motions upon tense cords, then certainly the Larynx which is composed of so many cartilages & ligaments, all liable to be drawn into a state of exquisite and acute tension by the action of the numerous muscles which move them, must be essential

to its formation, but Dr Hoy has
proved ~~by~~ upon a pig by an actual experi-
=ment, that the Larynx may be
removed from the throat, and yet
a sound nearly natural will be after-
=wards discharged thro' the glottis. —

4 If a piece of wax be applied to the
sides of the glottis, it does not change
the voice — but the application of
a piece of wax to a violin takes away
its power of emitting but sounds &
vibrations.

4 If sound depended upon cords, then
the more tense the cord, — the more
acute would be the sound, — and the
stronger the person who emitted the
sound, the more tense of course would

be the cords of his organs of Speech, - at this rate men who possess more strength than Women, and who are capable of giving most tone to the organs of Speech, would have more acute voices than Women - but the reverse of this is universally known to be the case. — The Uvula contributes much to the formation of the voice & yet we know it possesses no such action analagous to a musical cord. In blowing the nose, we observe the Sound produced, to be in proportion to the greater or less velocity of the Air thro the Nostrils, & to their greater or less aperture, now no one can suppose the Nostrils to have the least resemblance in their structure or uses to a cord

instrument. —

Is the resemblance of the Organs w.h form the Voice to Hundry wind instruments of Music, affords a strong presumption that Sound in both of them depends upon the same cause.

Is Sound increased in its Strength by the line of the passage thro which air passes in a wind instrument.[2]

Is it — or the Organs which compose the Voice // Is Sound encreased by the solidity, or tension of bodies thro which it passes —?. So it is in the Organs which compose the Voice?

— Is Sound encreased by reverberation as in the Conque Shell? So is the

Voice; — the ~~Lungs~~ Larynx — the Pharynx
— the mouth and the Nose all ~~assist~~ concur
to answer this purpose. — It is found
varied by certain nicer Surfaces in
the instrument thro' which it passes.
So is the Voice, — ~~it is found~~ It is found varied
by the number and difference of the Aper=
=tures ~~in~~ in the instrument
thro' which it passes? so is the Voice.
— It is most powerful, when it passes
thro' the Glottis; mouth — & nose in
their greatest State of extension. —
— In the ~~case~~ degree of Sound in any case proportioned
to the Quantity of Air in a Wind instru=
=ment which produces it. So is found.
This appears in a more especial

In some in Birds who the small,

~~[illegible]~~ emit

sounds which are far greater than
the sounds emitted by
many animals of a larger size; now

Birds we said formerly contain some-
= what of air not only in their lungs, but
in little cells which are connected with
them, as also in their very bones and
all of
feathers, which they employ, not only
in Respiration, but in singing (There is
another circumstance peculiar to the
Organs which compose the Voice of Birds
which deserves to be noticed. Their
Wind pipe is divided by means of
which is membranous
a double Glottis - the One is placed
in the bottom of the trachea - the
which is cartilaginous -
Other in the upper part of the larynx.

v a 7th argument in favor of the Voice being formed upon the principles of a wind instrument is that not only the human Voice but human Speech may be imitated by an echo; now this we know is produced by the reverberation of Sound only, & is no ways influenced by any thing analagous to a chord.

an 8th Arg[t] in favor of this Opinion is derived from the influence of certain diseases upon the Voice. an Abscess in the frontal sinus Dr Cline tells us in particular has been known to render the Voice dull - nor could it be cured till the matter of this Abscess was discharged: -

This structure is happily calculated to 189.
~~[illegible]~~ produces ~~[illegible]~~ a reverberation in
~~[illegible]~~ sound, and to supply the Absence of
those sounding bodies which are to be
met with in the heads of men, and
many other Animals.

// Having mentioned the arguments
which render it probable that the Voice
is produced by the discharge of Air thro the
Glottis, I go on to remark the Variety
of tones which are observable in
the Voice depends wholly upon the Variety
of motions in the Glottis. — M^r Dodart
in the memoirs of the Royal Academy of
Sciences computes these motions to a=
= mount to 96.32. — This Number would be
incredible did we not know that the
ear has in some cases been so far

refined by musick as to be capable of Dis=
=tinguishing such an immense Variety of Sounds
may serves to illustrate
as ~~tion~~ ~~fa~~ Mr Dodsley calcula=
=tion. ✓ musicians divide time into
what they call a Batuta quadrata or
the largest touch which is the 1/15 part
of a minute. This portion of time, they
again divide into four equal parts,
each of which they subdivide into fifteen
parts, so that at last four seconds of
a minute are divided into sixty four
parts, and the whole minute of time
into 960 parts. How Skilful musicians
know how to run thro the 64 parts of
the 1/15 portion of a minute so exactly,
that they are able to distinguish each
particle of the time that has been

Vowels are acute & grave according
to the greater or less contraction, or
expansion, elongation or shortning of
the Glottis. In uttering ♀ acute and grave
sounds, the =.

mentioned, every One of which is
produced by a different action in the
muscles which move the Glottis. But
the number & celerity of the motions of
in emitting sound
the Glottis go far beyond this instance of acute
& observation
and perception. —

Sounds are divided into acute, and
grave, and into strong and weak. V.

~~The acute Sounds are produced by~~
~~grave according to the greater or lesser elongation~~
~~the contraction of the Glottis. &c~~
~~altering acute and grave sounds, the~~

=Voice is sometimes lost — this depends
of acute sounds
in the case upon the Glottis
contracting so closely as to confine
case of grave sounds
the sound altogether — In the
sound
it depends upon the Glottis expanding

so wide, as to leave no rising between the lips of the glottis, and the Laryngo- by which means no collision is given to the air in its passage into the mouth.

Sounds are strong and weak according to the strength of the lungs, and the force with which Air is expelled thro' the Glottis. ——— Hence it is weak in Children and in old people. Hence probably the reason why it is weaker in Women than in men. ~~old~~ ——— The some Physiologists suppose the Glottis to be more contracted in Men.

Whispering is produced by so weak from the trachea an expulsion of the air as to produce none

The trachea is elongated & shortened
with the greater or less length of the
tones &c. The exercise of the trachea, &
glottis in singing are more fatiguing than
in speech. In singing case, the peritoneum
is very much protruded, & relaxed,
& hence the frequency of ruptures and
of fat bellies who are great singers
Countries the women in Catholic

Of these tremors in the Larynx - Bones of the mouth - nose - and head which produce a distinct Voice. These tremors are perceptable by placing the hand on the head of a person who is speaking with a distinct voice; but they are wholly imperceptable if he speaks only in a whisper. —

Singing is the protraction of the voice. The tremors produced by singing are so great as to be diffused thro the whole body, - so much so, that persons of nice perceptions have declared that they have felt them in the bones of the extremities. —

The Voice changes in men at

V It is likewise varied by the Location. The notes of the nightingale are always sweetest in the month of may. The human voice feels the influence of the Vernal Sun, tho' in a less Degree. It is varied by pain, & different pains produce different cries. — [illegible] is in part imitative — hence

2 + voice

the same Men of the same country & family have frequently the same kind of Voices. There is a case upon record by a German author of the Name of Shellhammer of a boy who by being brot up among Swine contracted their Voice so exactly in Squealing, that it could with difficulty be distinguished from it. The Citizens of the different States of America may all be distinguished by a Sameness & peculiarity of Voice.

In Order to the voice being clear the passage of the Air thro' the Nose should be easy & perfect. When

at puberty magnitude &
~~[illegible]~~ from an increase of strength
~~[illegible]~~ at that period of life ~~in~~ in
the Larynx
~~[illegible]~~. The
of the bowlread & nose
bones which assist in the formation of the
enlarge
~~[illegible]~~ ^ Voice likewise suddenly ~~[illegible]~~ at
the age of puberty. ~~[illegible]~~ The suddenness, and
inequality of the growth of the body at this
period, I shall say hereafter is a source
of many diseases. —

The Voice is much varied by the
passions. - It is quick and strong in anger -
- weak and plaintive in distress - soft in
- love & slow in supplication - all these
changes are produced by a difference in the
or action
contraction of the glottis. ✳[2] ——

✳ The recurrent nerve is essential
to the formation of the voice. By
dividing it, the voice is destroyed. a weakness

the nose is Obstructed, we are said to speak thro' it. The reverse of this is true. we do not speak thro' the nose. # See below

In explaining the Nature & cause of Voice I must not forget to mention that there is said to be ~~an~~ two speaking trumpets instead of this from this Stomach & Lungs. They are called Ventriloqui. This is a deception. The Voice

The modifications of the Voice depend on the size of the Glottis ~~& Epiglottis~~, & the length of the Trachea. =

= The Voice is stronger in a standing than in a sitting posture. This is so much the case that it may be perceived in a Congregation when they rise to sing the Doxology. It is improved by certain & diseases - by Delirium - by nervous excitement. It is weakened by eating a full meal, from the Stomach pressing up the thorax & lessening their Capacity for Air out of which the Voice is formed. I cannot conclude this Art.

or paralysis of this Nerve is probably the most
frequent cause of Paraphonia - & Aphonia
as we shall say hereafter. —

Thus far have I endeavoured to account
for the Voice. But in considering the
functions of the human body our inquiries
must not stops here. — a Voice alone would
give man no preeminence above many
other animals. It is by the division of
this Voice by means of a many thousand
motions into what is
called Speech that man acquires
a rank in the Scale of being more
singular and unequivocal than that
which he derives from his Reason,
for in the exercise of this operation of
the Mind many Animals have approached very

of the Voice without taking notice of the provision made to prevent its escape injuring the Lungs or Brain, & that is the Thyroid gland. By opening its Arteries it prevents the rupture of the Lungs & an undue quantity of blood being sent to y brain when we bellow, or speak very loud or for a great length of time. — That this is the case #

V 1: That ~~its is escape~~ there can be no Speech, where Respiration is not voluntary.
Here is no # where it is

2: Speech is formed principally as far as the Trachea & Larynx contributes to it, by the Glottis.

If the ~~Trachea or Larynx~~ be cut below the Glottis — there will be neither Voice nor Speech — If above, — the Glottis, there will ~~not~~ Voice, but no Speech, ~~which~~

is rendered more certain by those Animals which have no Voice having no Thyroid gland. This Ingenious experiment is the case in the Whale — but carries in the Dolphin & Seal.

Sharp — is not so in the Porpoise

Blumenbach Comp: Anat: p: 278. transverse

men him, but in the exercise of Speech
he stands alone. — I exclude hence the
words which certain birds have been
taught to utter from my idea of Speech.
— They are wholly unconnected with ideas,
and are as truly mechanical as any
of the antic motions which have been
taught to dumb animals. —

I begin my account of Speech
by remarking. 3 That it is wholly unimitative
and that if Children were not taught
a language of some kind, they would
be forced to convey their ideas like
brute dumb animals, entirely by signs or
inarticulate Sounds. —

However simple the function of
Speech may appear, it is acquired with

~~Dr. Brown~~ supposed the thyroid gland served the further purpose of arresting the impetus of the blood to the brain, and thereby of lessening the frequency of cephalic diseases, ~~[illegible]~~ This opinion was founded upon an experiments made # see below

V These organs are the Larynx - glottis - throat - palate - throat - mouth - tongue - lips and teeth - nose. Several of these parts are prepared for their respective Offices by being supplied by certain nervious caricis.

by Dr Cooper who found that disease of this gland. Suspect must have been some ~~[illegible]~~ there in this experiment, for in many persons in whom this gland has been diseased there has been no diminution of intellect, nor any other disease of the brain. I believe it is principally

immense difficulty - seldom in less than 15 or 18 months. I have known three instances in this city of its not having been acquired before the 8th year of life. —

~~In~~ In delivering the proofs by which children learn to speak, I shall confine myself to facts which have been the result of observations, made chiefly in my own family. —

To render the organs of speech sufficiently movable to enable them to pronounce the various simple elements of words which compose a language, it is necessary they should be properly exercised for that purpose. This exercise happens in the Larynx & Glottis & extends to the tongue. It ends in the

to prevent the rupture of the tympany
in loud singing & speaking. It probably
the further use of
serves to arrest sensation in
hysterical women and thus to protect
the brain. but of this more hereafter.

return to p 194 V

1st Larynx &
The Glottis are exercised by Crying. This
because the light of pain
sound so unwelcome to parents is wisely
sent to set the muscles of the Larynx
& glottis in motion, as well as to procure
relief from distress. — I think I have
observed in one instance the effects of
this motion upon Speech, — for the
youngest child I ever knew Spoke dis=
=tinctly before it was 18 months old.

2 The Larynx & Glottis are exercised by
Laughing - This begins early in life,
and is attended according to its degrees,
with very different dilatations, and
contractions of the Glottis. Perhaps the
principal reason why Crying & Laughing are peculiar
to the human species is to procure the acquisition of Speech.

3 Crowing - This exercise generally
begins about the 5th month. It is

furthus ... crying —

W See here again — the uses of ~~[illegible]~~

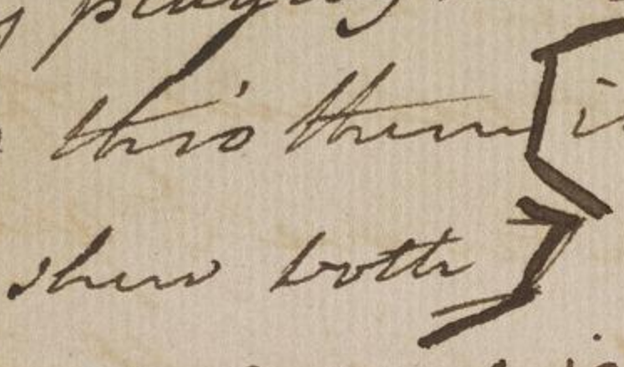
laughing &c — Besides promoting Respir[n] &c

by its means Animal life, they are

necessary to the production of Speech!

a slow ~~inspiration~~ expulsion of the air this the
brings attended with the sound of ou-
ou - ~~.~~ . It is to parents generally a very
pleasing sound
muscles of the
The tongue are exercised about the
7th or 8th month . Its first sounds are
generally dad, - dad, - dad; - hence
the origin of the epithet Daddy - It
is assumed ~~by~~ as the first
of a child
salutation to its father . Take notice here
the lips are not exercised in pronouncing this word.
The muscles of the lips begin to be
exercised about the 9th or 10th month by
uttering the sounds of baa - baa - baa
mam -
- mam - mam - mam = hence
the origin of the epithets - Papa - &
mama. - It is remarkable that
in most of the languages we are
acquainted with, parents are called by

Sometimes children exercise their lips by playing on them, or blowing them, in the following manner.



These shew both

+ This word name is derived from the latin word Vox, voice - to denote this preeminence is language to be such as that they are a part of the voice, preparitory to Speech. Consonants are the flesh & muscles of languages. They are all ## the preparation of children to acquire Speech is further assisted by the growth of the fore teeth, which are generally formed before they are 18 months old, & which in every period of life are useful in the formation of Speech.

soft & agreeable in proportion as they abound in Vowels. The Greek & Italian are the most agreeable languages in the world to the ear upon this account. The German - Swedish, Danish & English are the last so, from their abounding with consonants. [illegible]

of Lingual - or
Names which have some Labial Letters
in English. Dadda - Papa - mama - in French -
in Greek - as ~~Pater~~ - father - mother - Pere - Mere -
Pater in Latin - Fäder & moder in German
Madre - padre in Spanish - ~~and~~ Chinese
Fooehin - father - & mooehin mother in the
language! By the constant exercise of the
muscles ~~of~~ which move y^e glottis -
Larynx - tongue & lips - in this way,
for 18 months or two ~~of~~ years, Child-
-ren are prepared to acquire the know-
-ledge of a Language ~~of~~ or articulate
Sounds. — It is remarkable that in
all the inarticulate Sounds which I have mentioned,
we find some of the Vowels - for these
are the Skeleton of all Languages -
Language or words like Speech are acquired by
Children likewise only by imitation. The ear
and the eye are the avenues thro'
which the Use of Speech is conveyed

F There is one of the Consonants
which has been distinguished above all Others
by its ungrateful effects upon not only upon the ear, but
that is the letter R. upon the whole body &
Salzman relates a Story of a German
of the name of Kersting who was taught
the letters of the alphabet by placing his
hand upon his wife's mouth & discerning
the exact motions with which accompanied
her pronouncing every letter. upon her
pronouncing the letter R – a sense of horror
attended with Shuddering, pervaded
his whole frame. It would seem as if there
existed
a natural Antipathy to this letter in the
human ear – hence it seldom occurs in
the languages of the Indians nor of the
Africans. From the latter, the inhabitants
of Countries in which negro slavery exists
have learned to leave out the letter R

to them. —

Often children have brought forward as it were these little organs of speech to their parents' completely & unpolled by the exercises I have mentioned, & they endeavour to imitate them in the pronunciation of single words. These always at first words are substantive Nouns. — In their first attempts they make many mistakes — the sounds or words they utter are often as widely different as they can be from the words they are desired to utter, * But their little ears inform them of their mistakes and they attempt to correct them. — This keeps affords them exquisite delight, and if they repeat the word

in most of the English words in which
it occurs. [illegible] Hence we have
the words Summons =
[illegible]
winter - paper - Dinner - Supper - fear
& fire [illegible] [illegible]
[illegible]
summa - winta - papa - Dinna -
Suppa - fear and fire - by persons of
the first rank in those Countries.
[illegible] A kind of Rhetoric resorted
to, crept into their language.

go back to Op200
opposite side.

they hit upon, half a dozen times, they seldom forget it - but if they do not, they often hope it - and sometimes do not recover it for two or three months. - If children can make you understand what they mean, when they call any thing by a false name, they will seldom take much pains to correct it. - I have known a child call a Chariot a tart - & Sugar - Billy - long after he could pronounce half the words in our language merely because his parents consented to know what he meant by them.

In acquiring a language, Children are much assisted by looking the persons in the face who speak to them. - They acquire in this way much [illegible] the pronunciation

V They likewise acquire words much soo=
=ner, when they are sung to them than
when they are only spoken - and for this reason, ' accepted,
I dwell longer upon the ears; and being accom=
=panied with pleasure, more pains are
taken to retain them. It has been said that
ideas were originally conveyed in musical
tones, and that language has lost its tones by
the habits & pleasures of civilized life. It is
certain all Savages are fond of music, that
they express their passions in musical tones, &
that even their voices are
tinged with them - Moreover
Their tones are not only simple, but ex=
=tremely plaintive, & melancholy - a proof
among an hundred others that might be
mentioned, that they are every where &
miserable. To return —

of all those words which are spoken
by the motion of the lips. + [of this
more pruently]
The pronunciation of a Child is
seldom correct at first — even when
the utmost pains have been taken
by parents to prevent them being spoken
to in a childish manner. — Those words
in our language which have th: the letter
th — connected in them as this — that
the the are always learned with a
great deal of difficulty. Foreigners seldom
pronounce them perfectly.
is not only acquired by
Speech ~~is a branch of learning by~~
imitation, but its peculiarities are
influenced by it — hence when com-
towns —
-tries - families - & Schools have been
remarked to speak a like. These peculiarities
are acquired chiefly under 12 years of

I will illustrate what I mean by each
of those distinctions of sounds in different
languages. A. and O. produce gutteral
B and P produce labial . C and S:
dental L and R lingual
and M & N nasal sounds.

age. After that period the muscles ~~of~~ in
move the Organs of Speech are less easily
affected by imitation. I exclude here
those peculiarities of Speech which are
acquired by affectation. These are
picked ~~up~~ up at every period of life.
Other

Languages ~~are~~ differ from each in
the different proportions words which
are uttered by the throat - ~~and~~ tongue talk lips more exclusive
of each other. Hence ~~the~~ languages
are called Gutteral - ~~Dental~~ Lingual -
Dental ~~Labial~~ labial and nasal according as the motions of
tongue or lips predominate in each of
them. The following letters of the alphabet V
Indolence has a great influence
upon Speech. Hence we find the fewest
muscles employed in the Languages of
Savages who are all indolent. The

† In the pronunciation of Consonants
the Uvula - the palate - cavity of the nose - tongue -
teeth, & lips - are all employed. - The Hebrews
early observed this, and have divided
their consonants acording as they employed
these different parts into guttural -
palatine - Dental - labial & nasal.

Indians in this country use their tongues and lips as little as possible in conversation. Even ~~in~~ at public treaties, they grunt their assent to what is proposed to them this their treats. ~~They~~ all their languages partake largely of gutturals. sounds.

~~They~~ Indolence has the same effect upon the languages of civilized nations. The plethora of Vowels (If I may be allowed the expression) which compose the Italian language seems to have arisen from that cause - for ~~by~~ fewer muscles are employed in pronouncing words that abound with Vowels than Consonants.

The Arabians who are indolent from climate & government, use their tongues only,

† The same as in exposing the emotion of pity.

~~V~~ Rapidity of Speech is much influenced by facility in hearing, & quickness of perception. — Old men speak slow — because they hear imperfectly. — It is likewise influenced by the greater or less velocity of the circulation of the blood. It is rapid in a fever of great morbid action, also in anger, and it is slow in a fever in which the circulation is feeble as in the typhus, & also in a depressed state of the mind. By attending to this remark we may discover the state of a patient's circulation only by hearing him speak, before we feel his pulse.

in an affirmative } in a peculiar species
of intonation + — [describe it :] +

Some of our fellow citizens Gent:
(but I shall not ~~say to whom~~ mention the states to which they belong,) use an
affirmative that is uttered with nearly
as little trouble — by ~~throwing~~ the voice
against the roof of the mouth, and
thro' the nose — [describe it] +—

Thus — have I described the
origin — formation — & variety of speech
among men. That the Author I have
given you is a just one, I infer
from the success which attended the
attempts that have been made to
teach the deaf & dumb to speak. It was
first discovered by a Spanish monk of the name of Portius
and after being improved by

persons Dumb, but M^r Sicard remarks it would be more proper to call them silent.

To teach them to understand what is said to them. This has been done by teaching ~~persons who are~~ Dumb or silent, to observe the exact motions of the Larynx and Lips in the persons who speak to them, each of which have peculiar motions for every word they utter. In this way an=

several other persons was 207 refuted by Linnaeus
a Dutchman - a contemporary of Dr.
Boerhaave's - and has since been
adopted, ~~by Lobstone~~ an Act of
by a Mr Braidwood of Edin.r: and by
~~Lizzy~~ whom you will find in
the Encyclopidia. ~~of Arts~~ It has likewise
~~been lately improved~~
~~by Mr Sicard~~ been adopted
by Mr Sicard - of France.
To understand the nature of this
~~useful~~ Art, it will be necessary to
remark that in most of dumb per-
sons who are likewise deaf,
there is no defect in the Organs
of Speech. They do not speak because
they cannot hear, - and hearing is
the sense thro' which Speech is
chiefly
acquired. — It is common to call such

The first thing done in teaching
the dumb to speak, ~~is to~~

of which

V After they have been taught to under=
=stand what is said to them by Signs is to supple

The Scholar is then
to be directed to place this
hands upon the larynx of the throa=
=t, and to observe the exact tremor
or motions which accompany every
word the letters, which words are written
down, in order to be committed to
memory by him. The Master
then directs him to take the same notice of the
motions of his lips in speaking ... after
having previously discovered the exact

13. - he would direct him to shut
his lips, and at the same time to expel
the Air forcibly from the lungs - or suppose
he should direct him to pronounce the word
paper

~~Voice does not proceed~~ ~~from the throat~~ ~~but~~ ~~is~~ ~~formed~~ ~~by~~ ~~the~~ ~~Lungs~~ ~~&~~ ~~the~~ ~~Larynx~~ ~~&~~ ~~to~~ ~~teach~~ ~~them~~ ~~to~~ ~~expel~~ ~~the~~ air the Larynx, & to teach them to expel ~~the~~ ^ this it so as to excite an inarticulate Sound. The Larynx is expled by frequent=
=ly prefsing it. ~~The motion of the lungs~~ ~~is~~ ~~produced~~ ~~by~~ ~~the~~ ~~Larynx~~ motions of the lungs.

it is ~~the~~ necessary to give the tongue & lips in every word in a language, ~~to~~ the master ~~of~~ ~~the~~ ~~Scholar~~ directs ~~the~~ his Scholar ~~to~~ make those motions in the instant of their expulsion of the air from the lungs. — E.g: Suppose ~~he~~ wished ~~to~~ ~~direct~~ ~~the~~ letter ~~T~~ ~~to~~ ~~pronounce~~ him to pronounce the ~~letter~~ to ~~him~~ ~~he~~ would order him ~~to~~ he expel the air from his lungs two different times in a quick succession. During the first time - ~~he~~ would tell him to thrust his tongue against the teeth of his lower law, & to ~~the~~

V In this way Dr Hallar lets us
learn how to taught a boy to speak
read - and write in one month, and a
girl in two months, but in general,
it required a whole year to complete
the education of a Deaf or silent
person in the manner I have mentioned.

But Amman not only taught the
Deaf to speak, but from his knowledge
of all the motions in the organs of
speech which take place in the pronun=
=ciation of letters & words, he created for the
or bad pronunciation. For example he
directed a boy who used the letters (t) and (d)
instead of (k) to depress the
tongue with his fingers in order
to prevent its striking the
upper teeth. — After a while he was able
to depress his tongue from the power
his will acquired over it.

close his lips together at the same instant - this would produce the syllable pa - During the 2nd time he expelled the air from his lungs, sup= posed the master tip of his tongue to raise his tongue towards the roof of his mouth and at the same instant to close his lips - the syllable uttered would be - pa - which connected with pa - would be paper. V

By attending to this process I caused a little boy of using W for V in the word = gave ail veal

agreeably to the vulgar mode of speaking which is practised by some of the Citizens of the States: I directed him to press the teeth of his upper jaw upon

V Some words
are imperfectly pronounced from the ligament
of the tongue ~~being too long~~ not being
cut in early life. I have in several in-
-stances ~~a~~ cured these imperfections of speech
by cutting this ligament where it has
been of a preternatural length.

Speech is impaired not only by the loss of
the forefeeth, but by their preternatural size,
and projecting growing in clusters instead of rows from
the the upper & lower jaws. This defect in
speech has been corrected by removing some of
the teeth, or opening moderate apertures
between them, or reducing their length by
means of a file. —

his lower lip every the time he
attempted to pronounce those words.
as soon as he did this,
—They came forth ~~Tongue & Teal~~
with their proper Sound
to his great astonishment & delight.

V Dumb or Silent
~~Teachers~~ Persons who have been taught
to speak in the manner I have desi=
=bed, ~~are frequently~~ are frequently able to hold a Conversation
~~Observing~~ only by
of the Lips of the persons with whom
they converse. — Humanus
upon what he said,
taught a man to ~~speak~~ only by
directing him to move his lips as
he moved his, and at the same time
to expel air from his lungs the
to hear with his eyes,
taught a boy so perfectly, in this
(if I may be allowed the expression)
way, that he could ~~speak~~ to be drawn

It is recorded

~~by tradition the~~ of

Isaac Boerhaave, the nephew of the

celebrated Dr Boerhaave ~~who~~ that he received

~~the~~ impressions upon his ears thro'

the medium of his hands & feet.

This was a translation of a sense,

of which I shall speak more

fully hereafter. —

in writing a sermon, and afterwards
~~repeated~~ read it word for word to his friends
when he went home. The Acuteness
of perception in the eyes in these
cases goes almost beyond Conception.
It is possible they may perceive some
of these tremors & before spoke
which are communicated to
the head in speaking, for each word
I have no doubt
has its peculiar and
specific tremor or vibration. Should
this be the case, it would not ac-
=-count more Acute Light, - that was dis=
in the sense of
=-covered hearing in the two Duttons
whose history you will find in the
Natives of
Lectures upon Animal life. V

I shall have occasion to

In explaining the nature of Speech, I must not omit to mention that are men called Ventriloqui who are said to speak from their Stomachs. This is altogether a deception. The Speech is formed by the inspiration instead of the expiration of Air, and the Voice & Speech are in the lungs & not in the Stomach. I shall resume this Subject when I come to treat of Sound.

In receiving the wonderful Gift & exercise of Speech, it is impossible not to be struck with the wonderful exility of those motions in the Larynx Glottis - tongue - & lips by which it is performed. The English language consists of more than 40,000 words, nearly every One of which is uttered by motions in the above Organs different

resume this subject when we come to ~~[illegible]~~ mention the ~~[illegible]~~ cases of morbid voice and Speech in our Pathology - When I shall explain some matters which ~~[illegible]~~ would be foreign to a Lecture on Physiology.

I remain only that I mention the use of Speech. But here I am at a loss what to say than what I have said. I shall ~~[illegible]~~ only observe that by Speech man is ennobled above all the creatures in the world. Brutes are stationary in their knowledge in part, because they have no Speech. It is by means of Speech that the venerable Sage instructed his Children before the invention of writing & printing - By the use of this function we carry on the business of the world - It is the instrument by which knowledge is

from each other. This will not be invisible to you when you recollect the number & exibity of sounds which I mentioned at our last lecture, and which are distinctly perceived by a good musical ear. — But our wonder should not cease here. We meet with persons who speak, with the Latin & Greek ~~tongue~~ most of the modern languages of Europe. The distinct motions in the Organs of Speech of these persons probably amount to many hundred thousand, & are all at the same time so perfectly correct as to convey in an instant precise ideas to the persons who understand them. I beg you would remember these facts. I shall have occasion to apply them, when I come to treat of the Nature & Operations of the human Mind.

2t

chiefly conveyed from man to man — It
is the ~~vehicle~~ vehicle of eloquence — of
friendship — and love. — ~~and~~ But above
all — it is the means by which we
are permitted to address the great
father of the Universe, and to celebrate
his works among the children of men.

Mr Boyle ~~and~~ we are told made
it a practice always to ~~make a short~~
pause in conversation when he
mentioned the name of the Supreme
Being — Did we contemplate fully all
that is known of the wonderful manner
in which the voice and speech are formed,
we should go beyond Mr Boyle in our
homage to the Deity. — ~~We~~ Every time
we uttered a word, that conveyed an idea
to a friend; or to the public, we should

remains now ~~Had~~ I mention the
uses of Speech. By it, man is ennobled
above all the creatures in the world.
Brutes are stationary in their knowledge
chiefly because they are ~~destitute~~ destitute
of this precious gift of heaven. Where
there is no Speech, there can be but few
ideas, for words are said to be the signs
of ideas. They are the vehicles
of ideas, and without them ideas soon
perish in the mind. ~~Without Speech~~

I shall only add that this precious
discriminating
characteristic of man, has been supposed
to be the result of the gradual & successive
operations of human reason. I cannot
assent to this opinion. Had Speech depended
upon this cause, I believe at this day we

pause to admire the infinite ~~wisdom~~ wisdom
~~displayed~~ which is displayed by the divine
Artificer in the structure of those Organs
by which that word was pronounced.

Leaf 9th go on to p. 216

I have not yet lost sight of the human
figure which I fancied I first met with
on a visit to our globe. After surveying
the manner in which the motions of
his breast were performed in Respir.
I was led into a short digression by
to enquire more
particularly into the nature of those motions
by which he uttered Voice & Speech. He
~~to whom he spoke~~ spoke - Having
satisfied myself of the cause & manner
of each of them, I was next led to inquire into the nature of
those involuntary motions which

should have been but little above our
Domestic Animals in our Attainments to
knowledge of it. (There can be no Doubt but
Speech was originally given by the same
divine power which multiplied Languages
at Babel, and which in after ages is=
=ported to the twelve apostles the Gift of
Languages, and that our great progenitor
spoke one of them as certainly as that he
breathed or walked; for the historian that
relates the One, relates the Others. The posterity
of Adam acquired Speech and Language only
by instruction & imitation, as they have
done the knowledge of a thousand Other things.
Our Fathers have been to us what the Creator
was to Adam. The only difference in the
manner of our learning to speak is, we
require 18 Months, or two years to learn

lay beyond the reach of the eye sight,
particularly ~~into~~ the motion of the
heart ~~Indeed~~ of which he spoke frequently
in describing Respiration. — Feel here
said he —— upon this, I imagined
he placed my hand on his breast. —
Beneath it, I felt a strong pulsation.
— This said he is the heart. ~~It was~~
~~heart in this manner~~ It has beaten in this
manner for near 5000 times in an hour
30 years without one
moments repose, — It is in one respect
of life — ~~a source~~ ~~Life of organization~~ — all
the functions of the body depend more
or less upon it. — It moves the brain,
and is again moved by it — It furnishes
the fluid from which all the secretions

to speak perfectly, Whereas Adam was
Divinely
taught to speak perfectly in a few hours,
or perhaps in an instant. ~~Tongues~~

~~We~~ Having ~~treated~~ described the function
& uses of Respiration, more especially
its application to ~~Respiration~~ Voice
& Speech, we proceed next to treat of
the next effect of the implation of the lungs that
is the circulation of the blood. And
here I shall first enquire into = p:216

of the body are obtained, — in short its
presence, and action are essential to
~~animal~~ life, ~~in the~~ not only in the human
but in most of the animals in the
world. The prickly Hydra & one or
two animals are the only exceptions
to this Observation. — ~~But what is~~
~~the Structure of their hearts~~ In deliver-
ing the rest of the information derived in
my ~~investigation~~ way in this I shall, ~~first in~~
~~consider~~
~~the two actions of the heart inquire into~~
the course of the blood after it passes
thro' the lungs where we left it in
treating upon Respiration. 2dly I shall
~~describe~~
~~enumerate~~ some peculiarities in
the Structure of the heart & blood
Vessels. 3dly I shall inquire into

the powers which move the blood, and
4ly mention the advantages which are
derived to the system from this impor-
-tant function in the Animal Oeconomy.

1st The blood after passing thro the
pulmonary Arteries is received by the
pulmonary veins, by which it is
conveyed into the left auricle of the
heart — from whence it passes into the
left ventricle thro which it passes
into the Aorta, which conveys it by
numerous branches into every part
of the body. The blood thus distributed
thro the body, ~~is completed into~~ whether
discharged ~~into~~ immediately into con-
-tiguous & connected Veins — or into

glands for the purpose of secretion - or
into excrementous substances, as the corpora
cavernosa ~~penis~~ penis - or into serous vessels,
conveyed into the veins which meet in
is all ~~carried to~~ the vena Cava
this which it is passed into the right
Auricle of the heart, - from whence it
is emptied into the right ventricle
of the heart from which I said for-
-merly ~~carried to the blood~~ it was
thrown into the lungs in Respiration.

It is remarkable that the Auricles
& Ventricles of the heart are perfectly
synchronous - that is, both Auricles
contract, and both Ventricles expand
at the same time. The expansion of
the heart is called its Diastole - its

contraction is Systole. It is computed
℥ ℥ij of blood are discharged from the
heart [redacted] in every Contraction. The
Valves - which prevent the reflux of the
blood into the [redacted] Auricles & Ventricles
of the heart will be accurately demonstri:
& explained by the Professor of Anatomy.
- That part of the blood which is exha=
=led in a Coulorless form, [redacted] into ex=
=tern cavities and [redacted] upon most
of the External Surfaces of the body, is
[redacted] and which is not [redacted] taken up by the
Lacins, is Absorbed by a second Sys=
=tem of vessels called Lymphatics.
These [redacted] serve a Variety of useful
purposes to be explained hereafter,
but one of them is evidently to act as

it were, the part of an hand maid to the Veins, - to pick up the fluids which were too numerous - too mighty - or too much diffused, to be absorbed or carried by them to the heart. from any part of the body, After collecting this fluid the Lymphatics it with the Chyle into the left subclavian from whence Vein [illegible] after performed its Journey home having by a diffferent it route) enters with its kindred blood into the heart. —

2 I come now to mention some peculiarities in the Structure of the heart & blood vessels which favour the circulation of the blood in the manner

~~that has been described.~~

That the course of the blood I have described in the true one, I infer from the following facts & experiments.

1 From the effects of haemorrhages wh: ch discharge blood alike from every part of the body.

2 From the situation & structure - and functions of the Valves of the heart, which admit of the blood's passage only in one direction.

3 From the structure of the Valves of the veins which likewise admit of the blood's passage only in one direction.

4 From the effects of Ligatures which cause the veins to swell below, & the arteries above the place, where they are applied.

5 Iswn the Connexion & Continuation of Arteries and Veins being demonstrated by injections and microscopical Observations.

6 Iswn the effects of tying a Vein in a living Animal near the Cava, or from tying one of the pulmonary Veins. The part which is most remote from the heart in either of these expo. always swells, while that part which is nearest the heart becomes flaccid. If a corresponding artery be tied at the same time with the Veins, the Veins become empty, nor do they fill again Untill the ligature is removed from the Artery.

7 & Lastly Iswn the effects of transfusions

in which ~~the~~ blood ~~of one animal~~ is conveyed from the Arteries of one animal into the Veins of another animal, previously exhausted of its blood, by which means the blood vessels of the exhausted animal are completely filled, and the circulation carried on thro them with Vigor & regularity.

¶ I come now to mention some peculiarities in the structure of the heart, & in the structure & course of the blood vessels which favour the circulation of the blood in the manner that has been described.

1 The position of the heart in the Thorax where it is fenced by a bony case on every side greatly favours its free & constant action.

V 5 It is the reddist muscle in the body in man & all animals that have red blood.

6th

~~V~~ 6. It beats near 5,000 strokes in an hour, and during the longest life knows no intervals of rest. It moves the brain, & is again moved by it. It ~~[redacted]~~ is chiefly instrumental in conveying ~~the~~ that fluid to every part of the body from which all the Secretions are obtained. Its presence & its action are necessary to life, not only in man, but in most other animals. The prickly Hydra, and one or two more animals are the only exceptions to this observation. ~~[redacted]~~

~~[redacted]~~ The fire of the Heart is generally in pro= portion to

2 Its internal covering called Pericardium
while its ~~[illegible]~~ (from the Vapor or
Water which it constantly contains)
the more easy action of the heart,
serves to defend it from the compression
of effused fluids in the thorax. —

3 The Cardiac Nerves are accom-
panied by a coronary Artery which supplies
the heart with blood. From this Artery
nerves to give a more exquisite degree
to the Nerves of the heart
of ~~[illegible]~~ Irritability by keeping
their
up tension.

4 The heart is evidently a hollow
muscle, with some ligamentous parts, but
possessed of all the properties
of muscular fibres in every other
part of the body. —

~~5 From this structure of the heart, it~~

the Strength of an Animal. two

It possesses two Auricles and Ventricles in the human Species, and in all Animals that breath the like kind. In the whale, and in Amphibious Animals it has two Auricles & one Ventricle. It has one Ventricle and Auricle in fish — It has but a single Cavity in the tho the ear & in Insects. It identifies itself with a kind of Arterial Canal in worms & some insects & it disappears in the polypus & certain Zoophites.

It is remarkable that the right Ventricle continues to beat longer by Animal strokes in a dying Animal than the left.

by
10 It Its cavity is more irritable than its external Surface. In frogs turtles & several Other Animals it retains its powers of being acted upon a day or two after death. Its Sensibility is by no means equal to its irritability. Even when diseased the pain is dull - It is rather Anxiety, than pain. See Harvey p 285.
It has been found that the

9 Many experiments prove that it possesses
~~possesses~~ possess an exquisite degree of
~~irritability~~ Stimulability; ~~and~~

~~on applying~~ In a dying person, or even in a
person lately dead, the heart may be
excited into action by the ~~fluids~~ stimulus
of water or air injected or inflated into
it ~~by~~ or by heat ^ by certain Vapors,
or a Spark of Electricity. It is certainly
the most irritable parcel in the body:
of the Arteries

~~In the following~~ the following peculiarities with respect
~~to~~ to the Arteries deserve our notice, ~~and~~

~~1 Their coats~~

1 Their coats - The external is
cellular - ~~the internal~~ the internal is a fine polished substance
intended probably ~~to~~ as a covering

VI

p. 225

~~[illegible]~~ Its want
of sensibility in a bleeding state
~~[illegible]~~ has been provided by
Dr Harvey by many facts par-
ticularly by the history of a
young nobleman who when
a boy fractured his ribs on his
left side. A hole was made in the
which produced an opening to
membrane
that exposed the motion of the
heart. Dr Harvey pursued this

membrane & the heart with
it, but without giving the
least pain. The conduct
his patient to King Charles
who ~~did the same~~ ~~thing~~
did the same thing, and
with a similar issue to
the exp^{t}.

heart is more irritable in young Animals than in such as are full grown: the influence of the will hence it does not beat from habit, as was supposed by Dr Berkley.

11 To all these facts I shall add one more communicated to me by Dr Alex^r Ramsay an eminent Anatomist from Edin now in the District of Maine. He says he has uniformly found the Left Ventricle of the heart larger in all the Americans he had disected than in Europeans.

to the Middle which is more obviously a muscular coat of the Artery. This coat is of so compact a texture, and so much more like a membrane or an expansion of tendon, that Dr Haller & Dr Wm Hunter have both denied that it possess that stimulability which belongs to muscular fibre in other parts of the body. This Question shall be controverted in its proper place. In the mean while I shall only add that I shall maintain an Opinion contrary to both those Physiologists, & perhaps I may prove that Dr Haller in Spite of his objections to it, has unexceptionably assented to it.

✓ This simple Elasticity is greater near the
where it is most necessary
heart, than in their extremities.

= ~~[illegible]~~ In Hunter supposes the

∴ seat of Elastic power is in the external,

& — of the muscular power in the internal

~~[illegible]~~ coat of the Artery.

≠ The heart and the Arteries are synchronous
are felt at
in their pulsations - that is they ~~[illegible]~~
the same instant. ~~[illegible]~~ contract:

= ion ~~of the heart~~ forms the pulse of the
heart - dilatation forms the pulse of
the Artery.

2ly all the Arteries have veines and blood vessels - their blood vessels are called Vasa Vasorum. They come from neighbouring Arteries & not from themselves. They are likewise Lubricated with Lymphatics.

3 The Arteries possess great mechanical elasticity. This is evident from the pressure which a small piece of the artery of a dead Animal makes upon the finger. This simple Elasticity is greater in a dead Animal than in a living one - owing to the Diastole of the heart acting upon it in the living state. It is this distention of the arteries by means of each diastole of the heart that constitutes the Pulse. It is common to all the Arteries, the smaller ones, except in cases of inflammation.